

## CLAIMS

We claim:

1. An isolated nucleic acid molecule which encodes Fkh<sup>sf</sup>.
2. The isolated nucleic acid molecule according to claim 1, wherein said Fkh<sup>sf</sup> is murine Fkh<sup>sf</sup>.
3. The isolated nucleic acid molecule according to claim 1, wherein said Fkh<sup>sf</sup> is human FKH<sup>sf</sup>.
4. The isolated nucleic acid molecule according to claim 1, wherein said nucleic acid molecule is selected from the group consisting of (a) a nucleic acid molecule that encodes an amino acid sequence comprising SEQ ID NOS 2, or, 4, (b) a nucleic acid molecule that hybridizes under stringent conditions to a nucleic acid molecule having the nucleotide sequence of SEQ ID NOS: 1, or, 3, or its complement, and (c) a nucleic acid molecule that encodes a functional fragment of the polypeptide encoded by either (a) or (b).
5. The isolated nucleic acid molecule of claim 1, wherein said nucleic acid molecule encodes the amino acid sequence of SEQ ID NO:2.
6. The isolated nucleic acid molecule of claim 5, wherein said nucleic acid molecule comprises the nucleotide sequence of SEQ ID NO:1.
7. A vector comprising the isolated nucleic acid molecule of claim 1.
8. The vector according to claim 7 wherein said vector is a viral vector.

9. The vector according to claim 8 wherein said viral vector is generated from a virus selected from the group consisting of retrovirus, adenovirus, herpes virus, adeno-associated virus and alphavirus.

10. An expression vector comprising the isolated nucleic acid molecule of claim 1 and a promoter, wherein said promoter is operably linked with said nucleic acid molecule.

11. A recombinant host cell comprising the expression vector of claim 10.

12. A method of using the expression vector of claim 10 to prepare Fkh<sup>sf</sup> protein, said method comprising the steps of:

- (a) culturing recombinant host cells that comprise said expression vector and that produce said protein, and
- (b) isolating said protein from said cultured recombinant host cells.

13. An isolated polypeptide comprising an amino acid sequence encoded by the nucleic acid molecule according to anyone of claims 1 to 6.

14. An antibody or antibody fragment that binds specifically with the polypeptide encoded by the nucleic acid molecule according to claim 1.

15. The antibody of claim 13, wherein said antibody is selected from the group consisting of:

- (a) polyclonal antibody,
- (b) murine monoclonal antibody,
- (c) humanized antibody derived from (b), and
- (d) human monoclonal antibody.

16. The antibody fragment of claim 14, wherein said antibody fragment is selected from the group consisting of F(ab')<sub>2</sub>, F(ab)<sub>2</sub>, Fab', Fab, Fv, sFv, and minimal recognition unit.

17. A fusion protein comprising the polypeptide according to claim 13.

18. A method of detecting the presence of a *Fkh<sup>sf</sup>* nucleic acid sequence in a biological sample from a subject, comprising the steps of :

(a) contacting a *Fkh<sup>sf</sup>* specific nucleic acid probe under hybridizing conditions with either (i) test nucleic acid molecules isolated from said biological sample, or (ii) nucleic acid molecules synthesized from RNA molecules, wherein said probe recognizes at least a portion of nucleotide sequence of claim 1, and

(b) detecting the formation of hybrids of said nucleic acid probe and (i) or (ii).

19. The method according to claim 18, wherein said test nucleic acid molecule is obtained by RT-PCR.

20. A method of detecting the presence of an *Fkh<sup>sf</sup>*, or a mutant form thereof, in a biological sample, comprising the steps of:

(a) contacting said biological sample with an anti- *Fkh<sup>sf</sup>* antibody or an antibody fragment, wherein said contacting is performed under conditions that allow the binding of said antibody or antibody fragment to said biological sample, and

(b) detecting any of said bound antibody or bound antibody fragment.

21. The method of claim 20, wherein said antibody or said antibody fragment is selected from the group consisting of:

- (a) polyclonal antibody,
- (b) a murine monoclonal antibody,
- (c) a humanized antibody derived from (b),

- (d) a human monoclonal antibody, and
- (e) an antibody fragment derived from (b), (c) or (d).

22. The method of claim 20, wherein said antibody fragment is selected from the group consisting of  $F(ab')_2$ ,  $F(ab)_2$ ,  $Fab'$ ,  $Fab$ ,  $Fv$ ,  $sFv$ , and minimal recognition unit.

23. The method of claim 20, wherein said antibody or said antibody fragment further comprises a detectable label selected from the group consisting of radioisotope, fluorescent label, chemiluminescent label, enzyme label, bioluminescent label, and colloidal gold.

24. An isolated oligonucleotide which is capable of hybridizing to the nucleic acid molecule according to claim 1.

25. The oligonucleotide according to claim 23, further comprising a detectable label.

26. A method of introducing a  $Fkh^f$  nucleic acid molecule to an animal, comprising the step of administering a  $Fkh^f$  nucleic acid molecule according to claim 1 to an animal.

27. The method according to claim 26 wherein said nucleic acid molecule is expressed by a viral vector.

28. The method according to claim 26 wherein said nucleic acid molecule is expressed by a plasmid vector.

29. The method according to claim 26 wherein said nucleic acid molecule is administered to an animal *in vivo*.

30. The method according to claim 26 wherein said nucleic acid molecule is administered to cells *ex vivo*, and said cells are then administered to said animal.

31. The method according to claim 26 wherein said cells are hematopoietic cells.

32. The method according to claim 26 wherein said hematopoietic cells are T cells.

33. The method according to claim 26 wherein said animal is selected from the group consisting of humans, monkeys, dogs, cats, rats and mice.

34. A transgenic ~~non-human~~ animal whose cells express a transgene that contains a sequence encoding Fk<sup>h</sup> protein.

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